Neuropsychological Rehabilitation in Pediatric Oncology: comparison of neuropsychological profiles after intervention

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Introduction and objective

This is an adolescent who suffered a stage IV Non-Hodgkin-Lymphoma with CNS disease (MRI and CSF positive) at 11 years of age. She was treated according to LMB 89 protocol (Group C) including chemotherapy (IV and IT) and craniospinal radiotherapy (24 Gy), finishing her treatment in Complete Remission in March 2002. Later imaging studies showed signal changes in frontal white matter, related to therapy.

Our patient was assessed by the current neuropsychological assessment protocol running in our Unit. This set of tests includes multiple cognitive functions and also assessment of psychopathological disturbances. In September 2003 she showed a clear generalized cognitive impairment.

The rehabilitation was carried out taking into account her neuropsychological profile, age, perspectives and interests. We decided to work in academic skills, specially, due to her delay compared to her peers and group of age. The intervention lasted 10 months, 2 hours per week. It included techniques and study habits, academic abilities training (arithmetic, reading comprehension and writing), attention and memory exercises.

Wechsler Intelligence scale WISC-R profile

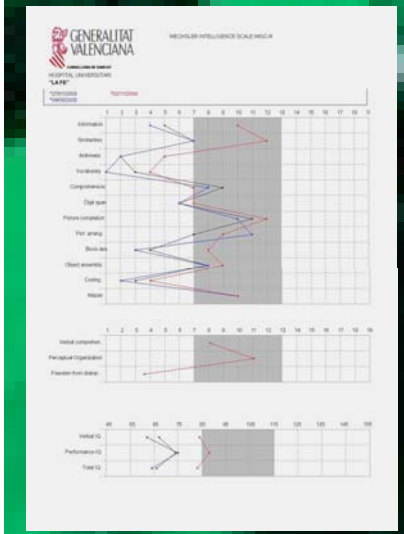
The analysis of the first two assessments shows low scores in verbal IQ and more difficulties in left hemisphere functions.

The latter assessment shows improvements in most of the subtests, being more important in verbal subtests . IQs stay in the medium-low range: Verbal IQ: 84, performance IQ 88 and total IQ 83.

This assessment is performed after 1 year of rehabilitation at home, done by a second-cycle pedagogue student in collaboration with our Unit.

The discrepancy between scores is reduced and it is only 4 points in favour of performance.

WISC-R factors show very good results in perceptual organization (11,1), good in verbal comprehension (8,1) and low in freedom from distractibility.



Neuropsychological profile

The neuropsychological profile in 2004 does not show a global cognitive impairment, differently to 2003.

We observe important improvements in general cognitive abilities, non-verbal skill, language and academic skills.

We think part of these improvements are due to the individualized rehabilitation carried our along this last year, with special emphasis in reading, writing and maths.

In 2004 assessment there are **deficit in**:

- Non verbal abilities: line orientation visuoconstructive praxias, non verbal abstract reasoning.
- Motricity: deficit in non dominant hand
- Language: auditory processing.
- Memory: memory for phrases, serial learning of words, spatial memory, visuoconstructive memory.
- Attention: sustained, selective and shifting. Conners CPT-II revealed attention deficit: slowered speed of processing.
- Executive functions: motor sequencing, non verbal fluency, flexibility.
- Academic abilities: writing and calculation.

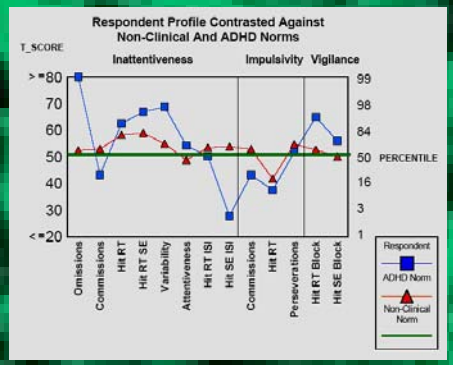
Strengths

Cognitive general abilities offer normality in all variables except for freedom from distractibility WISC-R factor.

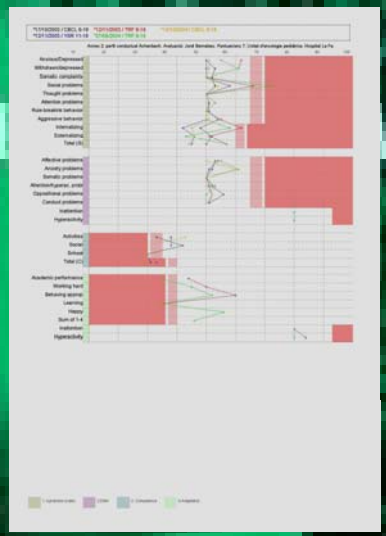
She obtained good results in motricity and perception. Improvement in language processes and non-verbal abilities is observed.

We observed good results in academic abilities that are below normality but have experienced a significant improvement during last year.

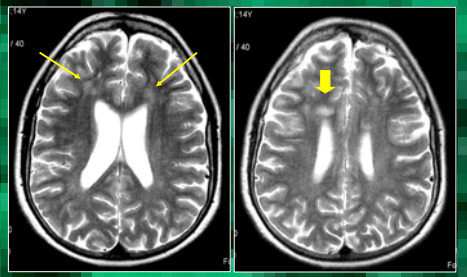
Conners' CPT-II offer significant attention deficit indicators. Results suggest slow speed of processing.



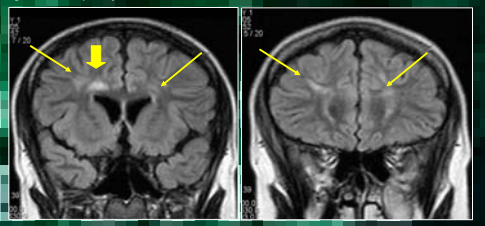
Psychopathological profile: shows Achenbach scales of teacher, parents and pacient. It detects social and learning problems and low academic achievement.



Figures 1-2. Axial-T2 images trough the body (right) and the roof (left) of the lateral ventricles show hyperintense white matter bilateral periventricular frontal foci (arrows), being more large and better defined the located on the right (black arrow).



Figures 3-4. Coronal-FLAIR images at the same levels show the lesions with greater conspicuity.



Results: results of neuropsychological assessment in 2004 offer significant changes, between 1 and 2 standard deviations, in the target areas of rehabilitation. Likewise, improvements between 12 and 19 points in IQ scores were obtained.

Conclusions: Rehabilitation in Pediatric Oncology should be directed to assist our patients´ long-term needs. Besides increasing those resources (school, family, social services) around and close to them, we want to develop individualized programs that let/can compensate the sequelae of cancer and its treatments. These first encouraging results show significant improvements (also quantified) in the trained areas.